

Recent Advances Used for the Determination of Reduced Sulfur Compounds in Ambient Air

Tim Slagle
Environmental Scientist
R4 SEDS/EIB/SAS
(706) 355-8741
slagle.tim@epa.gov

Key Words: sulfur, air, reduced, odor, VOCs, FPD

The analysis of low-level concentrations of reduced sulfur emissions that are the cause of odor complaints associated with refineries, sewage facilities, and kraft paper mills has become more important. Due to recent health standard amendments, the permissible air concentrations for these compounds are very challenging for existing analytical methods. The challenge of collecting and measuring these very volatile and highly reactive compounds is extremely difficult because they react not only with the containers they are collected in but also with each other.

The collection of sulfur compounds has traditionally been accomplished using Tedlar® bags. Unfortunately, the stability of low-level concentrations of sulfur VOCs in Tedlar® bags is less than 24 hours. The storage of VOCs in Summa® canisters is well documented, but the metal surface of the canister reacts with the sulfur samples. Recent technological advances provide a mechanism of coating the interior of the canisters with a glass surface only a few angstroms thick. This glass coating technology has greatly contributed to the collection and analysis of these highly reactive sulfur VOCs.

Region 4 SEDS is developing an analytical method that will concentrate a large sample volume by pulling the sample stream through a sampling train that has been entirely glass coated and heated. The sulfur compounds will be concentrated on a “trap,” a glass-coated tube that is cryogenically cooled with liquid carbon dioxide and packed with adsorbents, which the sulfur compounds will stick to. After collection, the trap is heated very rapidly, and the compounds are injected onto a gas chromatograph where the sulfur compounds are separated. The sulfur compounds are quantified using a Flame Photometric Detector (FPD).

This technology will be used in EPA Region 4 in partnership with federal, state and local agencies for ascertaining the reduced sulfur VOCs contained in ambient air emissions from industries and sewage treatment plants that may threaten public health and safety.

This state-of-the-art method will provide lower detection levels for reduced sulfur VOCs in ambient air, which will enhance the agencies ability to determine potential health hazards of these compounds.